11. Underway bird and mammal observations; submitted by Michael Force (Legs I & II).

11.1 Objectives: To obtain some understanding of mid- to late-summer seabird distribution, abundance, and habitat use in the pelagic waters of the Drake Passage and the neritic waters of Tierra del Fuego. Standardized data collection methodology will enable analysis of longer-term trends when combined with an existing data set encompassing transits from 7 AMLR field seasons.

11.2 Methods: Marine bird and mammal observations were conducted under suitable conditions throughout daylight hours during the transits between Punta Arenas and the AMLR study area. For the bird observations, an estimated 300 meter wide transect in a 90° quadrant on one side of the bow was used (Tasker *et al.,* 1984; van Franeker, 1994). Observations were made from either the bow or the bridge wing and consisted of a series of continuous 30 minute transects while the ship was underway on a constant speed and bearing. The strip transect was surveyed without binoculars. However, 10x40 binoculars were used regularly to scan the outer perimeter for cryptic species and to confirm species identifications. All the birds seen in the quadrant were recorded in two behavior categories, sitting or flying (combined in the analysis), and age was noted whenever possible. Ship followers were problematic and great care was taken to avoid recounts. Additional details included observation conditions, seastate and visibility. In contrast, marine mammal observations were conducted entirely on an opportunistic basis and lacked a dedicated and systematic search effort. Data collected included species identification, number of animals and any relevant behavioral/social information.

11.3 Accomplishments: Visual observation effort was possible during all days in transit: southbound 12, 13 January and 15, 16 February; northbound 9, 10 February and 13, 14, 15 March. The 2 southbound transits and the final northbound transit followed a similar route, while northbound at the end of Leg 1 was considerably farther west. Observations did not include the Strait of Magellan. Observation effort, dependent on favorable weather conditions, was not evenly distributed across all 3 strata. In total, 1,467 kilometers of trackline was surveyed during 65.6 hours of visual effort, recording 3,947 birds of 35 species. There were 31 marine mammal sightings of 8 species. An impressive concentration of feeding Fin and Humpback Whales was noted west of Aspland Island on 13 March.

11.4 Results and Tentative Conclusions: The route taken by the *R/V Yuzhmorgeologiya* during the transits traverse a broad range of seabird habitats. Because of this, the study area was stratified based on a combination of broadly applied geographical and physical considerations. The first stratum, Tierra del Fuego, is the neritic waters off the east side of Isla Grande de Tierra del Fuego south to about 55°30'S, and includes the bird-rich Estrecho de le Maire. The surface water is relatively warm with low salinity. Stratum 2, Northern Drake Passage, are pelagic waters from about 55°30'S to roughly the northern edge of the Polar Front. The surface water is colder than Stratum 1 with a higher salinity. Stratum 3, Southern Drake Passage, are the cold, lower salinity pelagic waters of the Polar front south to the AMLR study area. This provided an adequate working arrangement, even if there is some overlap, particularly in the mixing zone associated with the Polar Front.

Tables 11.1 to 11.4 summarize effort and sighting information. Thirty-four, 40 and 63 transects were completed in stratum 1, 2 and 3 respectively. Total number of species recorded in each stratum was similar with minor variations in species composition. Stratum 1, consisting primarily of coastal transects, had the highest number of species (24) and total individuals (2603). Sooty Shearwater accounts for almost 58% of this total. Ten or fewer individuals were seen for 58% of the species. Abundance and diversity declined south of the continent, with 17 and 22 species recorded in stratum 2 and 3 respectively. Moreover, 76% of the species in stratum 2 and 50% of those in stratum 3 recorded 10 or fewer individuals. On the other hand, 76% of the total birds seen in stratum 2 were prions. Fourteen species (40%) were recorded on at least 1 transect in all 3 strata while only 1 species, the Black-browed Albatross, occurs as one of the 3 most abundant species in every stratum.

There were several species seen this year not previously recorded on AMLR transits. Extremely far south of it's known range was the Stejneger's Petrel seen at 60°S in the central Drake Passage on 9 February. This species breeds only on Chile's Juan Fernandez Islands and ranges south to about 49°S (Enticott and Tipling, 1997). However, several beach derelicts have been recovered in New Zealand (Harrison, 1983). Careful elimination of the more likely but smaller Blue Petrel was based on previous experience with Stejneger's Petrel and differences in plumage and style of flight. A Cattle Egret in Estrecho de le Maire was also far south, although not as far south as those seen in the South Shetland Islands this field season. This species occurs regularly in the fall to Isla Grande de Tierra del Fuego (Fjeldså and Krabbe, 1990) and is well known for impressive post-breeding dispersal. Nevertheless, it seems there was a particularly well-developed southward dispersal this year.

11.5 Disposition of Data: All data, in both raw hardcopy format and in an Excel spreadsheet, is held by Michael Force, c/o Dr. Roger Hewitt, Antarctic Ecosystem Research Division, Southwest Fisheries Science Centre, La Jolla, CA. Roger.Hewitt@noaa.gov or mpforce@mac.com.

11.6 Problems and Suggestions: Coverage could be improved immensely if there were two or more observers. The marine mammal data is ancillary to the bird strip transect data because one observer cannot adequately survey for both simultaneously. Moreover, additional observers would allow a watch rotation thereby minimizing fatigue. More importantly, a second or third observer would allow data to be collected in such a way as to minimize flying bird bias.

11.7 Acknowledgments: I want to thank Mark Prowse, Derek Needham, and Michael Soule for making available to me the underway-environmental data obtained from the Scientific Computer System and for assistance with the spreadsheet. The use of a portable GPS receiver provided by Adam Jenkins is also gratefully acknowledged. A special thanks goes to Dr. Roger Hewitt for his support and assistance with some crucial aspects of the data analysis. Thanks to the bridge officers of the *R/V Yuzhmorgeologiya* for providing welcome hot drinks during some frigid watch periods. Lastly, I want to thank my fellow zooplankton team members for their support during the transits.

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Table 11.1 Effort summary.

	Stratum 1 Tierra del Fuego	Stratum 2 Northern Drake Passage	Stratum 3 Southern Drake Passage
# of transects (total=137)	34	40	63
minutes of effort (total=3935)	975	1162	1798
km of trackline surveyed (total=1467)	340.9	506.7	619.4
total birds	2603	706	637
area surveyed (km^2)	102.3	152.0	185.8
density (birds/km^2)*	25.4	4.6	3.4
mean SST (°C)	8.6	6.6	3.3
mean surface salinity (ppt)	33.15	34.02	33.81
mean seastate (Beaufort)	4	5	6

* includes flying birds

Table 11.2 Frequently observed species (>1% of total observations in at least one stratum)

Species	Tierra del Fuego				Northern Drake Passage				Southern Drake Passage			
	# of birds observed	unadjusted species composition (%)[§]	density (birds/km^2)*	frequency of occurrence (%)[†]	# of birds observed	unadjusted species composition (%)[§]	density (birds/km^2)*	frequency of occurrence (%)[†]	# of birds observed	unadjusted species composition (%)[§]	density (birds/km^2)*	frequency of occurrence (%)[†]
Macaroni Penguin *(Eudyptes chrysolophus)*	3	0.12	0.03	6	12	1.7	0.08	5	n/r	n/r	n/r	n/r
unidentified penguin *(Eudyptes sp.)*	24	0.92	0.23	24	14	1.98	0.09	13	n/r	n/r	n/r	n/r
Wandering Albatross *(Diomedea exulans)*	4	0.15	0.04	9	5	0.71	0.03	8	9	1.41	0.05	11
Royal Albatross *(Diomedea epomophora)*	31	1.19	0.3	47	5	0.71	0.03	10	1	0.16	0.01	2
Black-browed Albatross *(Thalassarche melanophris)*	616	23.67	6.02	97	67	9.49	0.44	65	87	13.66	0.47	56
Gray-headed Albatross *(Thalassarche chrysostoma)*	24	0.92	0.23	29	6	0.85	0.04	13	47	7.38	0.25	43
Antarctic Giant Petrel *(Macronectes giganteus)*	75	2.88	0.73	59	10	1.42	0.07	18	21	3.3	0.11	19
Southern Fulmar *(Fulmarus glacialoides)*	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	157	24.65	0.84	17
Cape Petrel *(Daption capense)*	2	0.08	0.02	6	n/r	n/r	n/r	n/r	86	13.5	0.46	13

Table 11.2 (cont.)

Species	Tierra del Fuego				Northern Drake Passage				Southern Drake Passage			
	# of birds observed	unadjusted species composition (%)[§]	density (birds/km^2)*	frequency of occurrence (%)[†]	# of birds observed	unadjusted species composition (%)[§]	density (birds/km^2)*	frequency of occurrence (%)[†]	# of birds observed	unadjusted species composition (%)[§]	density (birds/km^2)*	frequency of occurrence (%)[†]
Soft-plumaged Petrel *(Pterodroma mollis)*	1	0.04	0.01	3	1	0.14	0.01	3	22	3.45	0.12	16
Blue Petrel *(Halobaena caerulea)*	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	12	1.88	0.06	6
Antarctic Prion *(Pachyptila desolata)*	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	17	2.67	0.09	11
Slender-billed Prion *(Pachyptila belcheri)*	16	0.61	0.16	12	183	25.92	1.2	40	2	0.31	0.01	3
unidentified prion *(Pachyptila sp.)*	11	0.42	0.11	9	359	50.85	2.36	43	34	5.34	0.18	32
White-chinned Petrel *(Procellaria aequinoctialis)*	15	0.58	0.15	29	1	0.14	0.01	3	16	2.51	0.09	11
Sooty Shearwater *(Puffinus griseus)*	1500	57.63	14.66	74	1	0.14	0.01	3	5	0.78	0.03	5
Wilson's Storm-Petrel *(Oceanites oceanicus)*	147	5.65	1.44	41	9	1.27	0.06	18	29	4.55	0.16	27
Black-bellied Storm-Petrel *(Fregatta tropica)*	n/r	n/r	n/r	n/r	9	1.27	0.06	18	68	10.68	0.37	44
unidentified diving-petrel *(Pelecanoides sp.)*	6	0.23	0.06	18	9	1.27	0.06	15	10	1.57	0.05	13

Table 11.2 (cont.)

Species	Tierra del Fuego				Northern Drake Passage				Southern Drake Passage			
	# of birds observed	unadjusted species composition (%)§	density (birds/km^2)*	frequency of occurrence (%)†	# of birds observed	unadjusted species composition (%)§	density (birds/km^2)*	frequency of occurrence (%)†	# of birds observed	unadjusted species composition (%)§	density (birds/km^2)*	frequency of occurrence (%)†
Imperial Shag *(Phalacrocorax atriceps)*	60	2.31	0.59	32	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r

§: number of birds observed expressed as a percentage of the total birds recorded in the stratum
*: includes flying birds
†: number of transects with a detection expressed as a percentage of the total number of transects in the stratum
n/r: not recorded
nomenclature follows Clements (1991)

Table 11.3 Rarely observed species (<1% of total observations in at least one stratum)

Species	Tierra del Fuego				Northern Drake Passage				Southern Drake Passage			
	# of birds observed	unadjusted species composition (%)[§]	density (birds/km^2)*	frequency of occurrence (%)[†]	# of birds observed	unadjusted species composition (%)[§]	density (birds/km^2)*	frequency of occurrence (%)[†]	# of birds observed	unadjusted species composition (%)[§]	density (birds/km^2)*	frequency of occurrence (%)[†]
Rockhopper Penguin *(Eudyptes chrysocome)*	9	0.35	0.09	9	7	0.99	0.05	5	n/r	n/r	n/r	n/r
Magellanic Penguin *(Spheniscus magellanicus)*	1	0.04	0.01	3	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r
Light-mantled Albatross *(Phoebetria palpebrata)*	n/r	n/r	n/r	n/r	1	0.14	0.01	3	1	0.16	0.01	2
unidentified giant petrel *(Macronectes sp.)*	1	0.04	0.01	3	1	0.14	0.01	3	n/r	n/r	n/r	n/r
Kerguelen Petrel *(Lugensa brevirostris)*	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	5	0.78	0.03	8
Stejneger's Petrel *(Pterodroma longirostris)*	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	1	0.16	0.01	2
Westland Petrel *(Procellaria westlandica)*	7	0.27	0.07	15	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r
unidentified *Procellaria* *(Procellaria sp.)*	4	0.15	0.04	9	2	0.28	0.01	5	3	0.47	0.02	5
Greater Shearwater *(Puffinus gravis)*	22	0.85	0.22	21	1	0.14	0.01	3	n/r	n/r	n/r	n/r
Manx Shearwater *(Puffinus puffinus)*	5	0.19	0.05	6	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r

Species	Tierra del Fuego				Northern Drake Passage				Southern Drake Passage			
	# of birds observed	unadjusted species composition (%)[§]	density (birds/km^2)*	frequency of occurrence (%)[†]	# of birds observed	unadjusted species composition (%)[§]	density (birds/km^2)*	frequency of occurrence (%)[†]	# of birds observed	unadjusted species composition (%)[§]	density (birds/km^2)*	frequency of occurrence (%)[†]
Magellanic Diving-Petrel *(Pelecanoides magellani)*	2	0.08	0.02	3	2	0.28	0.01	5	1	0.16	0.01	2
Common Diving-Petrel *(Pelecanoides urinatrix)*	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	1	0.16	0.01	2
Cattle Egret *(Bubulcus ibis)*	1	0.04	0.01	3	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r
Snowy Sheathbill *(Chionis alba)*	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	1	0.16	0.01	2
Dolphin Gull *(Larus scoresbii)*	1	0.04	0.01	3	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r
Kelp Gull *(Larus dominicanus)*	6	0.23	0.06	12	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r
Antarctic Tern *(Sterna vittata)*	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	1	0.16	0.01	2
Southern Skua *(Catharacta antarctica)*	1	0.04	0.01	3	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r
Chilean Skua *(Catharacta chilensis)*	8	0.31	0.08	12	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r
South Polar Skua *(Catharacta maccormicki)*	n/r	n/r	n/r	n/r	1	0.14	0.01	3	n/r	n/r	n/r	n/r

Species	Tierra del Fuego				Northern Drake Passage				Southern Drake Passage			
	# of birds observed	unadjusted species composition (%)§	density (birds/km^2)*	frequency of occurrence (%)†	# of birds observed	unadjusted species composition (%)§	density (birds/km^2)*	frequency of occurrence (%)†	# of birds observed	unadjusted species composition (%)§	density (birds/km^2)*	frequency of occurrence (%)†
unidentified skua (Catharacta sp.)	1	0.04	0.01	3	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r

§: number of birds observed expressed as a percentage of the total birds recorded in the stratum
*: includes flying birds
†: number of transects with a detection expressed as a percentage of the total number of transects in the stratum
n/r: not recorded
nomenclature follows Clements (1991)

Table 11.4 Marine mammal sightings (listed chronologically)

Sighting #	Species	Date (d/m/yr)	Seastate (Beaufort)	Latitude (°S)	Longitude (°W)	Estimate			Comments
						best	high	low	
1	unidentified pinniped	12/01/02	4	54°16.9	65°25.9	2	2	2	
2	unidentified large whale	12/01/02	6	55°04.9	64°56.2	1	1	1	blow only, possible Humpback
3	Southern Bottlenose Whale *(Hyperoodon planifrons)*	12/01/02	2	56°10.1	64°09.6	1	1	1	adult male
4	Hourglass Dolphin *(Lagenorhynchus cruciger)*	12/01/02	2	56°13.5	54°07.2	3	3	3	
5	Hourglass Dolphin	12/01/02	2	56°17.9	64°04.4	2	2	2	
6	Hourglass Dolphin	12/01/02	2	56°56.0	63°36.2	15	20	12	
7	Hourglass Dolphin	12/01/02	2	56°59.7	63°33.6	3	3	3	
8	South American Sea Lion *(Otaria byronia)*	15/02/02	4	54°37.7	64°58.7	1	1	1	
9	unidentified dolphin *(Lagenorhynchus sp.)*	15/02/02	4	54°59.7	64°57.0	4	6	4	
10	Humpback Whale *(Megaptera novaeangliae)*	13/03/02	4	61°50.4	56°07.8	3	3	3	
11	Minke Whale *(Balaenoptera acutorostrata)*	13/03/02	4	61°50.4	56°07.8	1	1	1	
12	Fin Whale *(Balaenoptera physalus)*	13/03/02	4	61°46.0	56°15.5	2	2	2	probable cow/calf pair
13	Fin Whale	13/03/02	4	61°46.0	56°15.5	4	4	4	
14	Fin Whale	13/03/02	4	61°46.0	56°15.5	7	8	6	tight cluster, actively feeding

Sighting #	Species	Date (d/m/yr)	Seastate (Beaufort)	Latitude (°S)	Longitude (°W)	Estimate			Comments
						best	high	low	
15	Humpback Whale	13/03/02	4	61°46.0	56°15.5	1	1	1	
16	Fin Whale	13/03/02	2	61°41.3	56.23.1	2	2	1	
17	Fin Whale	13/03/02	2	61°41.3	56.23.1	1	1	1	
18	Humpback Whale	13/03/02	2	61°41.3	56.23.1	2	2	2	
19	Fin Whale	13/03/02	2	61°36.9	56.29.2	4	5	4	
20	Fin Whale	13/03/02	3	61°32.1	56°35.7	1	2	1	
21	Fin Whale	13/03/02	5	61°07.0	57°11.5	2	3	2	
22	unidentified large whale	13/03/02	6	60°43.2	57°44.2	1	1	1	blow only, possible Humpback
23	Fin Whale	13/03/02	6	60°35.5	57°55.1	1	1	1	
24	Southern Bottlenose Whale	14/03/02	6	57°52.7	61°28.8	1	1	1	adult male
25	Killer Whale *(Orcinus orca)*	15/03/02	3	54°51.5	64°54.0	6	8	5	
26	unidentified pinniped	15/03/02	4	54°47.1	64°53.5	4	4	4	possible South American Sea Lion
27	unidentified pinniped	15/03/02	2	54°41.6	64°52.7	1	1	1	
28	Minke Whale	15/03/02	3	54°40.4	64°52.5	1	1	1	
29	unidentified large whale	15/03/02	4	54°35.0	64°52.3	1	1	1	possible Fin Whale
30	Peale's Dolphin *(Lagenorhynchus australis)*	15/03/02	4	54°25.5	65°08.0	15	18	15	bow riding for almost 30 minutes
31	Peale's Dolphin	15/03/02	6	53°57.4	65°56.9	5	8	4	